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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/785,284	02/24/2004	Masaki Takeuchi	36856.1229	3846

7590 10/01/2004

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EXAMINER	
WAMSLEY, PATRICK G	
ART UNIT	PAPER NUMBER
2819	

DATE MAILED: 10/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/785,284	TAKEUCHI ET AL.	
	Examiner	Art Unit	
	Patrick G. Wamsley	2819	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 6-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 6-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 10/179,972.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *02/24/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-3 and 6-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,515,401 to Ando et al, hereafter Ando, in view of U.S. Patent 5,936,150 to Kobrin et al, hereafter Kobrin.

For claim 1, Ando provides a piezoelectric resonator [10] comprising a substrate [12]; a vibration unit [14] having a pair of opposed electrodes [18 / 20]; and a thin-film portion [16]. However, Ando does not disclose the newly added limitation involving silicon dioxide, hereafter SiO_2, and aluminum nitride, hereafter AlN, thin-film portions. In contrast, Kobrin combines AlN and SiO_2 piezoelectric layers [column 3, lines 25-32].

At the time of the invention, it would have been obvious to one of ordinary skill in the art to have applied Kobrin's piezoelectric layer teachings to Ando's resonator. The motivation would have been to achieve very high acoustic reflectivity [described in detail in column 4 of Kobrin] by using alternating layers.

For claims 2, 11, and 12 Ando uses a second harmonic mode [col. 4, lines 66-67] and includes two layers [14 / 16] having approximately the same thickness [col. 4, line 29]. Nodes of the second harmonic occur in both layers. In the combination with Kobrin, the layers would have been AlN and SiO_2.

For claim 3, the temperature coefficients of thin-film layers in a piezoelectric resonator are inherently defined to have opposite resonant frequency temperature coefficients [TCFs], thereby allowing positive and negative TCFs to cancel each other.

For claim 6, Ando's vibration unit [14] may be disposed over a thin area (concavity) or a hole to improve the performance of the resonator.

For claim 7, Ando employs a longitudinal thickness mode harmonic.

For claims 8 and 9, Ando's resonator inherently includes a hole / diaphragm structure, thereby permitting piezoelectric operation of the thin film layers.

For claim 10, Ando's opposed electrodes [18/20] may be made of aluminum or other suitable metals.

For claim 13, Ando's film thickness ratio is close to 1, within the cited range of about 0.6 to about 1.3 for parameter r.

For claims 14 and 15, Ando's TCF should be close to zero, due to the careful design of the layer widths. When different thermal expansion rates occur [col. 10, line 1], Ando performs compensation to control this problem.

Claims 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ando / Kobrin in view of EP 669,713 to Ogawa et al, hereafter Ogawa.

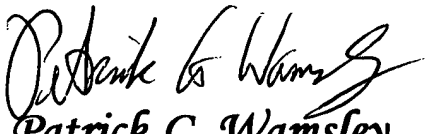
Ando and Kobrin disclose the use of piezoelectric resonators in oscillators but is silent regarding other applications of such devices. In contrast, Ogawa discloses ladder type [satisfying claim 17] piezoelectric filter [satisfying claim 16] used for radio communication [satisfying claim 20]. In addition, for claims 18 and 19, Ogawa's piezoelectric resonators are employed in a radio device having multiple modes, implying that the system is also at least a duplexer.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to have applied Ogawa's teachings to Ando / Kobrin. The motivation would have been to use a second harmonic mode piezoelectric resonator in a ladder-type filter for electronic communication, as described by Ogawa on lines 48-52 of column 2.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 5,520,785 to Evans et al discloses the use of AlN as a piezoelectric layer [column 2, lines 14-16]. U.S. Patent 5,936,150 to Kobrin et al combines AlN and SiO_2 layers [column 3, lines 26-29]. U.S. Patent 6,339,276 to Barber et al forms an acoustic reflective mirror [16] with alternating layers of AlN and SiO_2 [column 4, lines 60-62]. U.S. Patent 6,601,276 to Barber forms a similar mirror [14]. GB 2,379,108 to Takeuchi et al appears equivalent to the instant invention but has an earlier filing date.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick G. Wamsley whose telephone number is (703) 305-3504. Send facsimiles to (703) 872-9306 or (703) 746-8802.



Patrick G. Wamsley
September 28, 2004